

Occupational Exposures to Steel Dust in the NYC Subway: Assessing the Potential for Health Impacts

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Background: Increasingly, the subway is being recognized as an important microenvironment for air pollution research. The metals in steel dust have been detected at concentrations hundreds of times greater in the subway than at street level. We conducted a study of 50 transit workers and 25 suburban office workers to evaluate the potential for health effects due to occupational exposure to steel dust.

Methods: Subway workers carried personal air monitors for a period of one to three days. At the conclusion of the monitoring period, workers gave blood and urine samples. The levels of steel dust metals and biomarkers of oxidative stress and DNA damage in the biological samples of the exposed and control groups were compared. At the individual level, the strength of the association between worker exposure and the levels of the metals and biomarkers in their blood and urine was evaluated.

Results: Particulate matter (PM_{2.5}) concentrations varied greatly on the basis of job title as well as job activity, with a mean worker exposure during the work shift of 52 µg/m³ and a range of 6–469 µg/m³. Track worker exposures for the same individuals varied by as much as 800% from one night to the next. Urinary isoprostanes, a biomarker of oxidative stress, and DNA–protein complexes, a biomarker of chromium exposure, were detected at significantly greater concentrations for subway workers than for bus drivers. There was no statistical difference between subway workers and office workers.

Conclusions: At the population level, our preliminary results provide possible evidence for a connection between occupational exposure to steel dust and a biological response. We have detected no evidence for such a connection at the individual level.

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